Abstracts

Poster 2

P2.1 EXPOSURE-RESPONSE RELATION BETWEEN OCCUPATIONAL ENDOTOXIN EXPOSURE AND BRONCHIAL SYMPTOMS AMONG MALE COTTON TEXTILE WORKERS

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Introduction: The aim was to investigate the exposure response-relation between endotoxin exposure in a cotton spinning mill and bronchial symptoms.
Methods: The prevalence of bronchial symptoms was investigated within a cross sectional study among 150 cotton textile workers (response 47%) with interview, clinical investigation and ambient monitoring. The amount of endotoxin in dust samples was determined using the Limulus amebocyte lysate based (LAL) assay. Current endotoxin exposure was classified as ''low'', ''medium'', and ''high'' ($\leqslant$100, $>$100 to $\leqslant$450, and $>$450 endotoxin units (EU)/m^3, respectively). Atopy was defined as self-reported history of hay fever, atopic dermatitis, and/or allergic dermatitis (yes/no). Age and smoking adjusted odds ratios (OR) with confidence intervals (CI) were estimated.
Results: The 114 male workers were between 21 and 61 years. The age group between 20 and 59 years (n = 112) reported wheezing during the last 12 months more frequently than a population based national sample (22.3% *v* 11.1%). The prevalence of wheezing was higher in workers with medium and in particular with high current endotoxin exposure as compared to individuals with low exposure (medium: OR = 2.15, 95% CI 0.48 to 9.62, high: OR = 5.49, 95% CI 1.17 to 25.81). A similar effect was observed for cough (medium: OR = 2.11, 95% CI 0.59 to 7.56, high: OR = 3.93, 95% CI 1.02 to 15.12). The dose response of current endotoxin exposure on the prevalence of wheezing and cough was significant (test for linear trend: p = 0.020 and p = 0.040, respectively). The association between the exposure and wheezing was stronger in atopic workers (medium: OR = 1.96, 95% CI 0.15 to 25.34, high: OR = 19.29, 95% CI, 1.06 to 351.04, test for linear trend: p = 0.047). The higher prevalence of chest tightness and shortness of breath in workers with medium and high current endotoxin exposure did not reach statistical significance.
Conclusion: The results suggest a dose-dependent increase in bronchial symptoms with significantly increased risks above 450 EU/m^3. The prevalence of symptoms is probably underestimated due to the healthy worker effect and the low participation in light of upcoming organisational changes in the cotton mill.

P2.2 THE EFFECT OF COAL DUST EXPOSURE ON RESPIRATORY SYSTEMS OF COAL MINE WORKERS IN IRAN

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An attempt was made to evaluate the relation between the occupational exposure to coal mine dust and respiratory symptoms and pulmonary function parameters in East Alborz, Damghan of Iran. A comparative study in 75 workers and 32 healthy volunteers were performed in the studied area. Their health status was evaluated through questionnaires as well as spirometry device. Time weighted average of total and respirable coal mine dust in workers' breathing zone were monitored by using gravimetric method. The results showed that the workers in extraction section (tunnel 4) had the highest exposure to the total and respirable dust: 30.37 and 20.12 mg/m^3, respectively, whereas the workers' transportation section (tunnel 2) exhibited the lowest exposure; 17.79 and 11.20 mg/m^3. Air sampling showed that in the above mentioned rates in the mining areas were tenfold more than the time weighted average (TWA) of 2 mg/m^3 for respirable dust recommended for coal dust by the Iranian Technical Committee of Occupational Health (ITCOH). A significantly higher prevalence of work related respiratory tract symptoms such as cough (45%), dyspnea (16%), and mucus during work (25%) was found among the workers than in control group ($p<0.05$). Respiratory impairment such as restrictive pattern (25.3%), obstructive pattern (6.24%) was also significantly higher among workers than in the control group ($p<0.05$). The mean values of pulmonary function tests of the workers; vital capacity (VC) mean (SD) (3.73 (0.66)), forced vital capacity (FVC) (3.78 (0.78)), forced expiratory volume in one second (FEV_1) (2.89 (0.50)), and forced mid-expiratory flow ($FEF_{25-75\%}$) (0.78 (0.37)) were found to be significantly lower than in the control group ($p<0.05$). Through this study it was concluded that workers employed in coal mines are at risk for respiratory disorders and a continuous workplace monitoring is needed to evaluate workers' exposures.

P2.3 COTTON DUST EXPOSURE, RESPIRATORY SYMPTOMS, AND PEAK EXPIRATORY FLOW RATE IN TEXTILE WORKERS

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Introduction: The textile production industry is one of the oldest and most technologically complex of all industries. More than 800 000 workers in the textile industries are exposed in the workplace to airborne particles that can cause lung diseases. Respiratory symptoms in textile workers may be the result of inhalation of contaminants in the processing plants. The last reports emphasised that excess respiratory symptoms occurred chiefly among card room and blowing room operators. Peak expiratory flow rate (PEFR) monitoring is relatively simple and inexpensive for the screening and follow up of subjects. The purposes of this study was to measure cotton dust levels in workplace air, prevalence of respiratory symptoms, and determine changes in PEFR before and after among textile workers during workday.
Methods: This study was done among 38 workers in carding and blowing rooms. Using a short questionnaire for demographic characteristics, medical records were collected in a modified questionnaire of the Occupational Safety and Health Administration (OSHA), and 20 air samples were collected from the work area. The PEFR was measured with a peakflowmeter; these tests were supervised by a technician. All values were corrected to conditions of body temperature and pressure saturated with water vapor (BTPS).
Results: The mean cotton dust levels in blowing and carding rooms were 0.39 (SD 0.03) and 0.20 (SD 0.01) mg/m^3, respectively. The mean age and years of employment were 45 (SD 7.97) and 12.5 (SD 6.28), respectively. Thirty three per cent of the workers were smoking. The prevalence of respiratory symptoms increased with age and employment years and significantly between age and employment years with cough, phlegm, dyspnea ($p<0.05$, 0.05, 0.05, respectively). The mean PEFR before and after during workday were 362.9 (SD 147.8) and 305.8 (SD 147.5), respectively. The mean PEFR difference was significant ($p<0.0001$). The decline in PEFR was significantly associated with years of employment ($p<0.05$), whereas with age and cotton dust, levels were found to be non-significant. One explanation for the lack of age and cotton dust levels effects in workers may be the result of the low number of subjects and samples, respectively.
Conclusion: Our results showed that mean cotton dust level in blowing room was more than threshold limit values (TLV = 0.2 mg/m^3) (American Conference of Governmental Industrial Hygienists, 2003). Age and employment years may increase respiratory symptoms.

P2.4 COMPARISON OF CHARACTERISTICS OF OCCUPATIONAL ASTHMA ACCORDING TO MECHANISM AND MOLECULAR WEIGHT OF THE CAUSAL ALLERGENS

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Introduction: The study aimed to compare characteristics of occupational asthma (OA) according to mechanism (allergic or irritant induced asthma) and molecular weight of the causal allergens (high molecular weight agents (HMW) or low molecular weight agents (LMW)).

Methods: Patients with a confirmed OA, managed between 2000 to 2004 in four occupational health departments in Paris area, were separated into three groups: allergic OA caused by HMW (HMW group), allergic OA caused by LMW (LMW group), and irritant induced OA (irritant group). The three groups were compared on socio-demographic (sex, age, smoking habits), clinical (atopy, symptoms score, durations of exposure, and symptoms before diagnosis), and functional parameters (FEV1, FEF25–75%, FEV1/FVC, and PD_{20} methacholine). Bivariate analyses were performed using χ^2 and Wilcoxon's unpaired tests, and ANOVA.
Results: 255 subjects were included: 98 (38%) in the HMW group, 134 (53%) in the LMW group, and 23 (9%) in the irritant group. Most frequent allergens were flour (n = 55, 56%) and latex (n = 16, 16%) in the HMW group; persulphate salts (n = 36, 27%) and isocyanates (n = 33, 25%) in the LMW group. Proportion of men was higher in the HMW group (HMW group = 69%, LMW group = 49%, and irritant group = 52%, p = 0.008). Patients with irritant induced OA were older than patients with allergic OA (median 46 years, range 21–56 *v* median 38 years, range 16–60, p = 0.04). Prevalence of atopy was higher in HMW group (HMW group = 74%, LMW group = 37%, irritant group = 13%; $p<0.0001$). No difference was observed between the three groups concerning symptoms and functional parameters. Duration of symptoms before diagnosis was higher in the HMW group than the LMW group (5.7 (SD 6.2) years *v* 3.5 (SD 4.6) years, p = 0.003), but not the duration of exposure before occurrence of symptoms (7.7 (SD 6.6) years *v* 8.1 (SD 9.3), p = 0.69).
Conclusion: Severity of OA at diagnosis does not seem to be associated with mechanism of OA and molecular weight of the causal allergens.

P2.5 MONITORING OF POTENTIAL ACUTE RESPIRATORY EFFECTS AMONG NORWEGIAN AIRPORT WORKERS EXPOSED TO DE-ICING MIST

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Introduction: During winter, de-icing takes place on airports to prevent formation of surface ice on the outside of aircrafts. Preheated water with variable content of propylene glycol is used for the procedure, potentially involving workers to exposure of low toxicity chemicals at high levels. The study was initiated after reported cases of bronchial reactivity among exposed workers.
Methods: Non-smoking airport workers were monitored by spirometry and questionnaire during seven independent work shifts. Between five and seven workers were investigated each time. Investigations were carried out before, during, and after each shift. Exposure levels for each work period were measured and categorised in cooperation with an experienced occupational hygienist.
Results: There were no significant differences in FEV1 when measurements before, during, and after exposure were compared. However, the exposure levels were generally low on the monitored workdays with limited exposure contrasts between the different work shifts. There were no association between symptoms monitored by a questionnaire and estimated exposure.
Conclusions: The present investigation did not demonstrate acute respiratory effects or bronchial symptoms associated with exposure among de-icing workers. The limited number of work shifts monitored and relatively low exposure levels, compared with work shifts under extreme conditions, are limitations with regard to conclusiveness in the present investigation.

P2.6 ISOCYANATE USE IN THE UK

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Introduction: The incidence of occupational asthma, often caused by isocyanates exposure, is a cause of concern in the UK. This study investigated industry sectors in which isocyanate exposures occur, to (1) estimate the number of workers potentially exposed to isocyanates, (2) identify tasks where exposure occurs, (3) describe control measures used, and (4) assess exposure levels.
Methods: The target study population was 1500 companies in the motor vehicle repair (MVR) sector and 500 companies from other sectors. A telephone questionnaire obtained basic information on frequency and type of isocyanate use, ventilation, and use of personal protective equipment. A subset of survey participants completed a more detailed postal questionnaire. A series of site visits provided measurements of isocyanate levels in a sample of non-MVR companies.
Results: 2005 companies (>90% response rate) completed the telephone questionnaire. 82% of MVR companies with painting facilities used isocyanates. Ventilation was used in 99% of exposed tasks, while RPE was used in 99% of spray application tasks, and around half of the other tasks. In the non-MVR sectors, 49% of companies used isocyanates. Ventilation was almost always used in exposed tasks. Use of RPE was more variable. Extrapolation of the survey results to the UK population suggest approximately 15 000 workers in the MVR sector and 7000 workers in the non-MVR sectors are occupationally exposed to isocyanates. Site visits took place at 22 workplaces in the non-MVR sector. Out of a total of 160 measurements, 104 were less than the limit of detection (LOD) and 21 samples were less than the limit of quantification (LOQ), indicating generally low exposure levels. Six measurements were above the 8 hour limit value of 0.02 mg m^{-3} and a further four were above the 15 minute limit value of 0.07 mg m^{-3}. The highest measurements were obtained for spray painting trucks during manufacture and spraying polyurethane foam insulation.
Conclusions: The study has provided useful baseline data suggesting that over 20 000 workers in the UK are currently exposed to low levels of isocyanates in the workplace. From the results of the workplace investigations of non-MVR companies we conclude that exposures can easily be controlled to the current limit levels using basic exposure control methods.

P2.7 OCCUPATIONAL RELATED HEALTH PROBLEMS IN THE SISAL INDUSTRY

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Introduction: The sisal industry has existed in Tanzania for many years, and is becoming of increasing interest economically for the country. There is very little documentation of working conditions among workers in this industry. The few studies performed indicate respiratory problems among these workers. There is an increased concern about these workers from the Labour Inspection in Tanzania, as inspectors have observed several occupational problems. We wanted to examine these problems further, to evaluate the need for developing an epidemiological study.
Methods: Three sisal estates in Tanzania were visited, and a walk-through survey in each estate, visiting each department of workers, was performed.
Results: There were about 650 workers in each of these three estates. They had different jobs and different exposures. The major groups were cutters of leaves, transport workers, decorticators, workers brushing, workers weaving or spinning, and administration. The cutters reported injuries from the sharp sisal plants. The decorticators were exposed to aerosols from the crushed sisal leaves, and experienced skin exposure to water and plant juice. These workers reported skin and respiratory problems. Workers in brushing, weaving, and spinning were exposed to dust from the dry sisal fibres and reported respiratory problems. No use of personal protective equipment was observed.
Conclusion: There is a need to perform a proper epidemiological study of this working group to estimate the magnitude of the occupational health problems. A follow up study will be designed. The results from such a study will be of importance to plan proper interventions to improve the work conditions and health of the workers.

P2.8 PREVALENCE OF ALLERGY AMONGST HOSPITAL STAFF IN THAILAND

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Introduction: Prevalence of allergy amongst hospital staff has been unknown although 1 in 3 of the general population has been reported to have some types of allergy. Occupational allergy prevalence amongst hospital staff is still unclear but glutaraldehyde and latex allergy appear to be the most common causes of allergy among hospital staff. This study is aimed to describe the pattern of allergy amongst hospital staff in Thailand.
Methods: A total of 3206 self administered questionnaires was distributed to the three hospitals; 1000 for Lumpang Hospital, 900 for Hadyai Hospital, and 1306 for Rayong Hospital. The questionnaire was

used to collect data pertaining to work related allergic symptoms. Skin prick test (SPT) to the common environmental allergens such as house dust mite, Bermuda grass pollen, German cockroach, dog epithelium, and latex. Stallergenes 1:200 (w/v) and positive and negatives controls were performed. Descriptive statistics were used in this study.
Results: 1948 out of 3206 (60.8%) completed the questionnaires. The majority of responders were female staff (97.8%). Only 3.45% were smokers. 18.8% were atopics. The most common atopic diseases found in the studied group were eczema (12.8%), followed by hay fever (8.3%) and asthma (4.1%). There were 37.5% (761) reported to have some types of skin allergies. 31.6% (643) used to have urticaria and 11% (223) found to have urticaria caused by latex products. For other common environmental allergies, the hospital staff reported to be allergic to house dust (23.2%), followed by nickel (10.6%), animal dandrufts (8.5%), fruit (1.0%), and cow milk (0.7%) respectively. SPT showed the positive reactions to standardised mite; Df with 8.5% followed by standardised mite; Dp (6.27%), standardised Bermuda grass pollen (5.3%), latex glove extract (5.3%), German cockroach (3.1%), cat pelt (1.3%), and dog epithelium (0.3%) respectively.
Conclusion: Hospital staff in Thailand have a similar prevalence of atopic diseases to general population and the most common cause of allergy was dust mite, like general population. However, a higher prevalence was found in hospital staff in Thailand for latex allergy.

P2.9 AIRWAY INFLAMMATION IN WASTE COLLECTORS EXPOSED TO BIOAEROSOLS ASSESSED BY INDUCED SPUTUM

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Introduction: Exposure to bioaerosols can cause respiratory health problems. So far, the health risk from exposure to bioaerosols in the waste industry is less known, although ODTS and airway irritation have been reported among workers handling the waste. Different methods have been used to measure health effects and exposure. The objectives of this work are to examine airway inflammation by use of induced sputum and to correlate the findings with the exposure during waste collection.
Methods: In total 25 workers participated in the survey (participation rate 87%). Each worker underwent sputum induction and spirometry before work start on Monday morning and on the following Thursday morning. Induced sputum was performed as described by Pin. Personal exposure was monitored during work on Monday, Tuesday, and Wednesday. Inhalable aerosols were collected with two PAS-6 cassettes, one for determination of endotoxins and $\beta(1\rightarrow3)$-glucans (LAL assay), and the other for determination of bacteria and fungal and bacterial spores (scanning electron and fluorescence microscopy).
Results: The median exposure levels to bacteria ($0.8\times10^6/m^3$) and fungal spores ($0.2\times10^6/m^3$) were moderate and low for endotoxins (13 EU/m^3). The median concentration of neutrophils, eosinophils, and IL-8 in sputum increased significantly from Monday to Thursday, 0.5×10^6/ml to 1.2×10^6/ml, 0.2×10^6/ml to 0.3×10^6/ml, 1.1 ng/ml to 1.4 ng/ml, respectively. The median endotoxin ($r^2=0.55$, $p<0.05$) and $\beta(1\rightarrow3)$-glucan ($r^2=0.49$, $p=0.09$) exposure correlated with the increase in IL-8. FEV_1 was reduced on Thursday (−0.12 l), and the decrease in FEV_1/FVC correlated with the increase in neutrophils ($r^2=0.51$, $p<0.05$).
Conclusions: The study suggests that the moderate exposure to bioaerosols during collection of waste induced a lower airway inflammation dominated by a neutrophil infiltration and activation. The inflammatory response was related to microbial components in the bioaerosol, and more pronounced for endotoxin than $\beta(1\rightarrow3)$-glucan exposure.

P2.10 OCCUPATIONAL HEARING LOSS IN THE PETROLEUM INDUSTRY

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Introduction: The aim was to analyse the incidence of reported occupational hearing loss in the Norwegian petroleum industry 1992–2003. This industry has for many years focused on noise as a risk factor, and the workers in the industry are screened for hearing loss by audiometry at regular health examinations every or every second year. Noise levels may be high on several locations and during several types of work in the petroleum industry. Shift work of 12 hours duration is common. Since 1992 the Petroleum Safety Authority in Norway has had a reporting system for work related diseases in the petroleum industry. Such information might be helpful in further prevention of occupational hearing loss.
Methods: Descriptive analyses from the register of work related diseases from the Petroleum Safety Authority in Norway are presented.
Results: Hearing loss and musculoskeletal disorders were the most frequently reported work related diseases. A total of 1709 cases of occupational hearing loss were reported to the Petroleum Safety Authority from 1992 to 2003. The incidence of reported hearing loss varied a lot during the period, from one per 1000 in 1992 to nine per 1000 in 2002. Most cases were found in the age group 50–59 years. The largest number of reported hearing loss was found among process technicians, roughnecks, mechanics, and electricians.
Conclusion: The reported number of occupational hearing loss among workers in the Norwegian petroleum industry in the period 1992 to 2003 shows that hearing loss is an important challenge. Control measures are still needed. Continuous improvement of reporting system and further research on risk factors and control measures should be discussed.

P2.11 OCCUPATIONAL CANCER IN POLAND IN 1971–2004

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Introduction: Due to its gravity and certificating problems, occupational cancer has a special place among the occupational diseases. The fact that occupational tumours do not possess any clinical or histological characteristics which would distinguish them from their non-occupational counterparts constitutes a serious problem in diagnosing occupational cancer. Latency periods for occupational cancers are very long and, therefore, the disease often affects elderly people. Thus, the contribution of the occupational factors to the environmental cancer development is certainly underestimated. Insufficient knowledge on the carcinogens and patient workplace conditions also contributes to the underestimation of the number of occupational cancer cases.
Methods: This work is based on the information compiled from the occupational disease reporting forms gathered in the Central Register of Occupational Diseases run by the Nofer Institute of Occupational Medicine, Lodz, Poland.
Results: In 1971–2004, the number of diagnosed occupational cancer cases ranged from 13 to 142 per annum, 2366 in total. The collected data indicate a growing proportion of occupational cancer in the total number of occupational disease cases. In 1971–94, the disease accounted for 0.5% of all recorded cases; for the period 1995–2003, the proportion was as high as 1.4%, reaching in 2004 the value of 3.3%. The incidence (number of fresh cases per 100 thousand workers) in 2004 was 1.23, which was over 50% higher than in the previous year. The most frequent tumour locations were: lung (43.8%), larynx (20.8%), bladder (9.7%), pleura (6.0%), skin (5.0%), and haematopoietic tissue (4.1%). The most frequent cause factors were: asbestos, polycyclic aromatic hydrocarbons, and ionising radiation. The majority (91.7%) of patients with diagnosed occupational cancer were males. The incidence in the males was also higher than in the females (in 2004: 2.1 *v* 0.3 per 100 thousand workers). Lung was the most frequent location, both in the male and the female workers (44.8% and 33.0%, respectively).
Conclusions: The growing proportion of cancer in the occupational diseases in general certainly reflects the effects of exposures experienced many years ago. On the other hand, this growing trend results also from a higher awareness, both among doctors and patients, of the carcinogens found in the work environment.

P2.12 A POPULATION BASED COHORT STUDY OF THE EFFECT OF COMMON MENTAL DISORDER ON DISABILITY PENSION AWARDS

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Objective: Mental illness is consistently under recognised in general health care, which may lead to under estimation of its effects on awards for social security payments. We investigated empirically the

contribution of psychiatric morbidity to the award of disability pensions, in particular those awarded for physical diagnoses.
Method: Using a historical cohort design we used an unique link between a large epidemiological cohort study and a comprehensive national database. Baseline information on mental and physical health was gathered from the population based health study of those of working age (20–66 years) not claiming disability pension (n = 45 782) of Nord-Trøndelag County in Norway in 1995–97 (the HUNT-2 study). The outcome was the award of disability pension within 6–30 months, ascribed to specific ICD-10 diagnoses, as registered in the National Insurance Administration.
Results: Anxiety and depression were robust predictors of award of disability pensions in general (PAF = 0.11), even when disability pensions awarded for any mental disorder (any F-diagnosis) were excluded (PAF = 0.08). These effects were only partly explained by baseline somatic symptoms and diagnoses, and were stronger in individuals aged 20–44 than in those aged 45–66. Somatic symptoms accounted for far more awards of disability pensions than did somatic diagnoses.
Conclusions: The cost of common mental disorders in terms of disability pension and lost productivity may have been considerably underestimated by official statistics, particularly for younger claimants. We suggest this might be due both to overuse of physical diagnoses and underrecognition of common mental disorders in primary care.

P2.13 WORKING LIFE EXPECTANCIES: AN OVERVIEW WITH AN APPLICATION TO FINLAND

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Introduction: The well established demographic concept of life expectancy and the related techniques have also been applied to the study of labour force status and mobility via constructing a working life table and computing estimates of working life expectancy—that is, the future time a person is expected to spend in employment.
Methods: The aim of this paper is to place a recently developed estimation method in the context of other methodologies and to discuss specific distinctions between the different analytic approaches. Given multiple cross sectional survey data, a multistate (multinomial) modeling with a multivariate logistic regression analysis provided a means for a consistent estimation of marginal probabilities of work-health states, and subsequently working life expectancies (Nurminen, *et al*. 2005 (in press)).
Results: Although there was a greater increase between 1981 and 2001 in the Finnish male life expectancy (5.1 years) compared with the female figure (3.7 years), the future working life declined more for men (1.5 years) than for women (1.0 year). While the male working life expectancy at the age of 25 years, expressed as a percentage of future working life to the statutory retirement age of 65 years, decreased by 4% units (from 75% to 71%), the respective decline for women was less, 3% units (from 70% to 67%).
Conclusions: In Finland, the population is aging rapidly, and issues of unemployment, disability, early retirement, and related concerns are of social and economic importance. Therefore, the need for reliable quantitative information supporting intervening health policy measures to defend the sustainability of a welfare state is compelling. In future analyses, a multistate Markov chain modeling with logistic regression will be applied to individually linked longitudinal cohort data from Finnish censuses, relevant population registers, and surveys to estimate transition probabilities, and subsequently working life expectancies—for example, by age, year, sex, industrial classification, and occupation.

P2.14 INDIRECT ADJUSTMENT FOR SMOKING: ISSUES IN A RETROSPECTIVE OCCUPATIONAL COHORT STUDY ON LUNG CANCER

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Introduction: Prevalence data on potential confounders are often lacking in retrospective occupational cohort studies. Consequently, investigators may rely on surrogate prevalence data to adjust indirectly for the confounder. The aim of our analysis was to compare smoking prevalence data and estimate the effect on potential confounding in a retrospective occupational cohort study on asbestos exposure and lung cancer.
Methods: We estimated the prevalence of smoking for a historical cohort of male and female asbestos textile workers (n = 745) distributed among four plants in North Carolina (NC) and one in New Hampshire (NH) through a review of data from questionnaires administered during 1965–66. Prevalence data for an unexposed referent group were obtained from a published national survey. Confounding relative risks (RR_{co}) were calculated using smoking prevalence (never/former/current) and the background risk for the disease.
Results: We obtained RR_{co} of 1.33 and 1.16 for NC and NH, respectively, when we examined the data by state. The RR_{co} for each of the four NC plants ranged from 1.47–1.87 with white collar workers as the unexposed referent group and from 1.16–1.47 when other (non-asbestos) textile workers were the referent group. We conducted additional analyses by sex and found notable differences if males only were used as the exposed population. Among men, the RR_{co} for all plants ranged between 1.10–1.58 when other textile workers were used as the referent group, and 1.39–2.01 when white collar workers were the referent group.
Conclusion: These results demonstrate that selection of an appropriate surrogate population is important when cohort specific information on confounder prevalence is lacking. The underlying assumption that the confounder prevalence estimated from a surrogate population is representative of the study population may not be valid; data from surveys of other workers may provide biased prevalence estimates. Even within cohorts similar in industry, geography, time, and sex, variability in the prevalence of smoking is significant and can affect the ability to control confounding by indirect adjustment.

P2.15 HEPATITIS B INFECTIONS IN HAIRDRESSERS: ANALYSING HEALTH INSURANCE DATA

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Introduction: Treatments in beauty parlours are considered a risk factor for blood borne virus infections. Some studies suggest an increased prevalence of hepatitis B infections in hairdressers and barbers. Hairdressers might get into contact with the blood of their clients while inflicting minor bleedings on them through cutting and shaving. Therefore the question arose whether hairdressers are exposed to an occupational risk of blood borne virus infections.
Method: The sick leave rate from hepatitis was analysed using the data of a health insurance that covers about 40% of the German hairdressers (IKK). The data do not allow to separate for the different forms of viral hepatitis.
Results: An age and sex adjusted relative risk of 1.2 (95% CI 0.8 to 1.7) was found for hairdressers. For male hairdressers, however, an increased relative risk of 3.8 (95% CI 2.0 to 7.2) was observed. The relative risk for female hairdressers was 0.8 (95% CI 0.3 to 2.1).
Conclusion: These results do not support the hypothesis that hairdressing might be associated with an occupational risk of blood borne infections, but suggest that the elevated risk in male hairdressers is related to other characteristics of the population.

P2.16 *HELICOBACTER PYLORI* INFECTIONS IN GASTROENTEROLOGISTS

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Introduction: *Helicobacter pylori* is a widespread bacteria, which prefers the gastric mucosa. *H pylori* infection is a risk factor for severe diseases like gastritis, peptic ulcer, and gastric cancer. Oral-to-oral transmission is generally believed to be the main route of infection. *H pylori* has been isolated from the gastric secretion of patients who have undergone endoscopy. Therefore the question arises whether gastroenterologists and the assisting nurses are at risk for *H pylori* infections.
Method: The epidemiological studies looking into this problem are reviewed in this paper. Studies were rated regarding their quality. Prevalence rate ratios were calculated in order to render the study results comparable.
Results: So far, seven methodically sound papers, five of them showing an increase rate for infection for gastroenterologists, have been published. Results for nurses assisting in gastroscopy are less convincing. Two out of five methodically sound studies showed a statistically increased infection rate.
Conclusion: *H pylori* associated diseases in gastroenterologist should be considered as occupational diseases. For gastroenteric nurses the studies

are inconclusive. They indicate an infection rate lower than that for gastroenterologists, if there is a risk at all.

P2.17 HEALTH IMPLICATIONS OF OCCUPATIONAL EXPOSURE TO ANAESTHETICS IN HEALTHCARE WORKERS

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Aim: To assess health implications on anaesthesiologists in long time low level occupational exposure to anaesthetics and to identify appropriate prophylactic measures.
Method: Cross sectional study on 128 healthcare workers occupationally exposed to anaesthetics (halothane, enflurane, isoflurane) versus matched controls. GC exposure evaluation, clinical examination, immunochemistry, respiratory function tests, and oxidative stress markers (SOD, TBARS) were performed. To assess the possible effect of anaesthetics on the immune function, peripheral lymphocyte subpopulations, NK cells percentage, and NK cytotoxic activity were determined in a subgroup (n = 33).
Results: Anaesthetic concentrations in workplace air were under but close to TLV. Irritative respiratory symptoms prevailed. Discrete distal obstructions were found in 45.3% of workers versus 22.8% in controls ($\chi^2 = 10.1$, $p < 0.01$, OR = 2.7, CI 1.4 to 5.2). SOD and TBARS were significantly higher in exposed ($p < 0.01$). Serum immunoglobulins changes suggested alteration of the humoral immune response. The anaesthesiologist subgroup had significantly lower percentages of T cells, higher NK cell percentages ($p < 0.05$), and slight increase of percent specific cytotoxicity (17.0%) compared with a lower exposed group (6.1%).
Conclusions: It seems that below the current TLV, occupational exposure to anaesthetic gases could interfere with defence mechanisms. Further research could lead to the reconsideration of current exposure standards as a suitable prophylactic approach.

P2.18 EXPOSURE TO DIOXINS AMONG INCINERATOR WORKERS: VALIDATING SELF-REPORT BASED EXPOSURE INDICES

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Introduction: In 2002, we launched a large scale cohort study focusing on risk assessment for cancer mortality and changes in the sex ratio of offspring among the municipal solid waste incinerator workers. In this cohort, we assessed exposure to dioxins for the each subject based on self-administrated questionnaire, because personal blood dioxin measurement is extremely expensive. However, it is still important to validated our exposure indices based on blood dioxin measurement of subgroup of the cohort.
Methods: We obtained information on job history and frequency (0: none, 1: once in 1–3 years, 2: several times per year, 3: several times per month) of cleaning/maintenance work of the inside of incinerators from 9105 municipal waste collection/incinerator workers in 2002–04. As some municipalities have conducted blood dioxin measurement for surveillance purpose, such data for 38 workers among the whole subject were available. We examined correlations between concentrations of PCDDs/PCDFs in the whole blood and several exposure indices, namely (1) duration of work, (2) cumulative exposure index (duration × frequency), (3) frequency category of cleaning/maintenance work.
Results: The TEQ values of PCDDs and PCDFs did not show clear relation with any of exposure indices. Among 17 congeners, only 1,2,3,4,6,7,8-HpCDF associated with exposure indices though it was not statistically significant. The correlation coefficients (r) for its concentration and exposure indices were 0.212 ($p = 0.244$), 0.136 (0.459) and 0.172 (0.346), respectively. The r value for the duration of work was improved when the age at measurement was adjusted ($r = 0.295$, $p = 0.113$).
Conclusion: Kumagai *et al* (2000, 2002) reported that duration of work associated with serum 1,2,3,4,6,7,8-HpCDF concentration in a different population of incinerator workers in Japan. Our data are consistent with their results and support that duration of work can reflect exposure to dioxins. Available data are limited and the models for exposure assessment might have been too simple. We are doing additional data collection to refine exposure models in this particular population.

P2.19 CANARIES OF THE SKY. COMMERCIAL AIRCRAFT CABIN AIR CONTAMINATION AND AIR CREW DISABILITY: A CASE SERIES

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Introduction: Concern over neurological symptoms and perceived employer and medical inaction led pilots and flight attendants to initiate an exploratory survey.
Methods: The purpose of the study was to describe the symptoms and treatment of pilots and crew experiencing fume events in the course of their work in commercial aircraft. Concern over neurological symptoms and perceived employer and medical inaction led pilots and flight attendants to initiate an exploratory survey. The purpose of the study was to describe the symptoms and treatment of pilots and crew experiencing fume events in the course of their work in commercial aircraft. Unions of pilots and flight attendants in the UK, Australia, and USA canvassed their membership for affected crew to submit descriptions of symptoms and treatment. Responses were unstructured.
Results: Data were analysed descriptively according to categories including occupation, aircraft type, country of employment, symptoms, work disability, medical treatment, diagnosis, onset of symptoms, and involvement of other crew and passengers. The comments of crew were also examined. 60 pilots and crew responded with self reports of disabling symptoms interfering with ability to fly an aircraft. Commonly, other crew members and passengers were affected concurrently. For one third of the sample disability continued and has prevented a return to work. A reluctance to report fume events was common especially among pilots. There has been a reluctance to acknowledge the problem in a number of sectors, repeating a pattern of response to new medical problems seen frequently in medical history.
Conclusions: Aircrew are giving a warning of a significant aircraft safety and public health problem. The response to and implications of this warning will be examined.

P2.20 WORK RELATED ACCIDENTS AND OCCUPATIONAL DISEASES IN VETERINARY ASSISTANTS

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Introduction: The potential for work related injuries is high in veterinarians. But so far little attention is given to the health risks of veterinary assistants.
Method: Approximately 9000 veterinarian practices comprising about 27 500 veterinarians and their staff are covered by the Institution of Statutory Accident Insurance of the Health and Welfare Services (BGW). Every year about 800 accident and occupational disease claims are filed by veterinary assistants. The claims for a five year period from 1996 to 2000 were analysed.
Results: Compared to general practitioner assistants the age adjusted relative risk for an occupational accident is 5.3 (95% CI 4.8 to 5.9). Most accidents are caused by animals (77%), cats being the most frequent cause (54%) of all animal related injuries. Most occupational diseases are caused by animal related allergies (52%). Only verified occupational diseases considered, skin diseases (52%) and allergic asthma (40%) are the most frequent occupational diseases. Zoonoses are responsible for 7% of all verified occupational diseases in veterinary assistants.
Conclusion: Prevention strategies for veterinary assistants should focus on accidents caused by animals. The prevention of occupational diseases should focus on skin diseases, respiratory diseases, and infections.

P2.21 OCCUPATIONAL EXPOSURE TO PESTICIDES AND SEMEN QUALITY

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Introduction: There are theories that male fecundity is reduced by pesticides exposure. Therefore, a large study was performed on the association between reproductive disorders and pesticide exposure among Dutch greenhouse workers. A two step data collection procedure was applied. The first step comprised a questionnaire survey about reproductive disorders and pesticide exposure. In the second step, a selection was made of male and female greenhouse workers exposed to pesticides. In this step, fertility parameters and pesticide exposure were further evaluated.

Methods: The male workers (n = 37) donated a sperm sample in March 2003 and a second sample in September 2003. In these samples, sperm count, motility, and morphology were measured according the World Health Organization guidelines. Pesticide exposure in the three months before sperm sample donation was measured by questionnaires and a workplace survey in which an observational method (DREAM) for structured, semi-quantitative dermal exposure assessment was used. The estimated DREAM score is a continuous measure and a high score correlates with a high exposure.
Results: The mean age of the men was 43 years. The mean sperm concentration was 108 million/ml in March and 80 million/ml in September. The percentage of motile sperm increased during the year from 37% in March to 51% in September, whereas the percentage morphologically normal sperm was unchanged (12% and 13%). As expected, the DREAM score for pesticide application increased during the year. The average DREAM score was 22 (range 0–282) in the winter period and 31 (range 0–134) in the summer. In the preliminary analyses, there seems to be no association between the different semen parameters (concentration, motility, and morphology) and the DREAM score.
Conclusion: At this moment, the results do not confirm the hypothesis that male fecundity measured by semen quality is at risk in pesticide exposured workers.

P2.22 ASSOCIATION OF ALLERGIC RHINITIS AND ASTHMA WITH USE OF PESTICIDES AMONG GRAPE FARMERS IN CRETE

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Introduction: Pesticides may contribute to respiratory symptoms among farmers. The aim of this study was to explore the association of allergic rhinitis and asthma symptoms with use of pesticides among grape farmers in Crete.
Methods: A cross sectional study was carried out in Malevisi region in Northern Crete. One hundred and twenty grape farmers were examined. The protocol comprised a questionnaire, skin prick tests for 16 common allergens, measurement of specific IgE antibodies against eight allergens, and spirometry before and after bronchodilation. The questionnaire contained items on respiratory symptoms (present during the last 12 months) and a detailed occupational history. In the end of the questionnaire there was a list of 50 commonly used pesticides (trade names), and grape farmers were asked to identify the compounds that they had used.
Results: In an age and sex adjusted analysis, allergic rhinitis was found to be significantly associated with the use of herbicides (OR 2.6; 95% CI 1.1 to 5.7, $p<0.05$), and the use of fungicides (OR 2.5; 95% CI 1.1 to 5.6, $p<0.05$). Further analysis showed significant associations of allergic rhinitis with the use of dithiocarbamate fungicides (OR 2.4; 95% CI 1.1 to 5.1, $p<0.05$), the use of triazole fungicides (OR 2.5; 95% CI 1.1 to 5.5, $p<0.05$), the use of carbamate insecticides (OR 3.0; 95% CI 1.4 to 6.3, $p<0.01$), and the herbicide ''glyphosate'' (OR 2.2; 95% CI 1.0 to 4.8, $p=0.05$), after adjusting for age and sex. The same analysis for asthma did not show any significant associations.
Conclusion: Exposure to specific agricultural chemicals could be related with allergic rhinitis symptoms.

P2.23 ACUTE AND SUBACUTE POISONING INCIDENCE IN PESTICIDE EXPOSED AGRICULTURAL WORKERS

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Introduction: There are 10 million agricultural workers in Mexico that are daily exposed to organophosphate pesticides. Different authors had suggested that chronic cholinesterase inhibition may produce tolerance, which diminishes acute effects and can cause subacute symptoms with normal cholinesterase levels. The aim of this study was to determine the acute and subacute poisoning incidence and their relation with the exposure and the cholinesterase level in an agricultural workers group.
Methods: It was carried out a prospective cohort study with 106 migrant agricultural workers. A questionnaire was applied and the erythrocytic cholinesterase concentration was measured before and three months after the pesticides exposure of the workers. A general, non-specific, and specific symptoms classification was made. This symptoms were used to characterise acute and subacute poisoning. The exposure was defined with an index. It was made up by 15 quantitative and qualitative variables of the organisation and division of work, and the migrant farmers habits and customs. Differences between groups were analysed by relative risk, χ^2, and *t* test.
Results: A significant increase of symptoms was observed between both measures, $p=0.03$. Exposure level had an association with specific and non-specific symptoms, $p=0.005$ and $p=0.03$. Acute poisoning incidence was 2.8×100. Subacute intoxication in exposed workers had an accumulated incidence rate of 24×100 and 15×100 in those non-exposed. Relative risk in exposed was 55% bigger than in non-exposed workers, $p=0.000$, CI 0.663–3.636. Cholinesterase and haemoglobin diminished significantly between the first and the second measure, $p=0.000$. However we did not observe a significant association among cholinesterase and exposure level neither in acute nor in subacute intoxication. For both first and second measures, we detected anaemia. This disease was increased from 21% to 28%, $p=0.000$. There was an important difference among men (16%) and women (63%), $p=0.000$, and in anaemia and exposure level, $p=0.03$.
Conclusion: We found an important increase of symptoms between the first and the second studies. We also detected a high accumulated incidence rate of subacute poisoning without a significant cholinesterase decrease association. These findings support the hypothesis about a probable cholinesterase level adaptation and the presence of persistent symptoms when chronic but moderate exposure occurs. It is essential to carry out further studies about these chronic effects in Mexican agricultural workers.

P2.24 DNA POLYMORPHISMS IN CYP3A5 AND GSTP1 GENES ARE ASSOCIATED WITH AN INCREASED RISK OF DNA DAMAGE IN PESTICIDES EXPOSED FRUIT GROWERS

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Introduction: Pesticides have been observed to be associated with several neoplastic disease and congenital malformation in previous epidemiological studies. Animal studies have been indicated that pesticides may be metabolised by hepatic cytochrome P450 3A5 (CYP3A5) enzymes, paraoxonase 2 (PON2), or glutathione S-transferases (GSTM1, GSTT1, and GSTP1). However, for human CYP3A5, PON2, GSTM1, GSTT1, and GSTP1, little is known about the effects of pesticides on their corresponding genetic polymorphisms and genotoxicity. Thus, this study was designed to investigate whether metabolic genotypes affected DNA damage level in pesticides exposed fruit growers.
Methods: We conducted Comet assay of 91 fruit growers who experienced pesticides exposure and 106 unexposed controls to evaluate individual extent of DNA damage in peripheral blood. Questionnaires were administered to obtain demographic data, cigarette smoking habits and medical and occupational histories. The genotypes of CYP3A5, PON2, GSTM1, GSTT1, and GSTP1 were identified by polymerase chain reaction (PCR).
Results: The results showed that subjects experiencing high or low pesticides exposure had a significantly greater DNA tail moment than did controls. Our multiple regression model also revealed that age ($p<0.01$), high pesticides-exposure ($p<0.01$), low pesticides-exposure ($p<0.01$), CYP3A5 ($p=0.03$), and GSTP1 ($p=0.01$) genotypes were significantly associated with increased DNA tail moment. Further analysis of CYP3A5 and GSTP1 gene combinations, revealed an increased trend for these genotypes to influence DNA tail moment for the high pesticides exposure group.
Conclusion: These results suggest that individuals with the susceptible metabolic CYP3A5 and GSTP1 genotypes may experience an increased risk of DNA damage elicited by pesticides exposure.

P2.25 THE EPIDEMIOLOGY OF WORKPLACE SOLVENT EXPOSURES

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Introduction: The aim of the study is to come up with an epidemiological study on chemical exposures at work and related illnesses. Based on the data, a risk exposure assessment will be established as a guide to occupational health practitioners.
Methods: The study used a multistate stratified sampling of manufacturing industries in export zones in the Philippines. Thirty one industries were measured in terms of noise, heat chemical exposure, radiation, and ventilation. Five hundred workers were given questionnaires.
Results: There was 100% use of chemicals in the industries used as raw material or solvent for processing. The blood lead result of the 285

subjects revealed that 40.7% of the total number of subjects had blood lead result within the 21–30 ug/dl which is considered by the Department of Health dangerous. When hazards and illness were correlated with alpha set at 0.05, radiation exposure was associated with bone pain, and dust exposure with eye strain, and viral exposure, solvent exposures with respiratory illnesses, abortion, and anaemia. Based on the results, a proposed exposure rating for chemical exposure is done. This allows an easy guideline for the assessment of chemical hazards considering factors such as contact with the body surface, generation of vapor within the breathing zone, threshold limit values (TLV), and exposure time. For example, exposure rating estimate of 0 means no exposure either through dermal contact or within the breathing zone of the worker.
Conclusions: This study looked into actual chemical and other hazard exposures of workers. The proposed hazard rating matrix will allow the concerned to quantify and address problems that may arise from chemical exposures.

P2.26 OCCUPATIONAL EXPOSURE TO XYLENE IN PATHOLOGISTS EMPLOYED AT HOSPITALS, QAZVIN CITY, IRAN

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Introduction: Nowadays, aromatic hydrocarbons such as benzene, toluene, and xylene are extensively used in different environments and industries, causing adverse effects on individuals who are being exposed occupationally and environmentally to these hazardous compounds. In this study, occupational exposure to xylene in pathologists, employed at pathology wards of different hospitals belonging to the Qazvin University of Medical Sciences has been investigated.
Methods: Methyl hiporic acid (MHA) as a main metabolite of xylene in urine was used to evaluate the workers exposure to this chemical compound at hospitals. The urine samples were taken from all 30 pathologists from four main hospitals belonging to the Qazvin University. Through this study, 30 administrative employees were also selected as control group. The direct DBA colorimetric method was used to measure MHA in the pathologists' urine.
Results: The results obtained from this study showed that, there were significant differences between MHA of workers' urine related to and working days, type of jobs, and length of exposure time ($p<0.05$). This study also showed that, there were no significant difference between urinary MHA concentration and sex, age, and smoking habit ($p>0.05$). Through this study, it was clearly obtained that, xylene exposure cannot affect to the total and direct serum bilirubine in the workers' blood.
Conclusion: Urinary MHA as a metabolite of xylene can be changed at different working days, and jobs. Also, decreasing in both exposure time of pathologists and the use of xylene can be considered as the main parameter of reducing MHA in urine. However, personal factors and habit including sex, age, and smoking are not most relevant to the level of urinary MHA.

P2.27 CHANGES IN EXPOSURE ASSESSMENT WITH DIFFERENT LEVELS OF INFORMATION

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Introduction: Retrospective exposure assessment in cohort studies requires large amounts of time and considerable resources. The amount of information available is assumed to influence the quality of the assessments, but it also affects the time and cost. Little information has been provided as to the change in assessments as more information becomes available to the investigator.
Methods: Job histories of 4700 shipyard workers were collected in an epidemiological study to investigate causes of death from cancer and other diseases. Each job was assessed for probability and intensity of exposure to solvents, lead, and asbestos, and for confidence (low, moderate, and high for each metric) by an industrial hygienist. The jobs were assessed four times using increasing amounts of information: (1) job titles only; (2) job titles plus job descriptions; (3) job titles, descriptions and reports identifying changes in the shipyard, an exposure inventory, and walk-throughs of the site; and (4) all of the above plus 582 measurements.
Results: Of the 2000 jobs in the shipyard, about 1100 were estimated to have solvent exposure, 1000 lead exposure and 900 asbestos exposure when all sources of data were considered. This was an increase for solvents (11%), lead (40%), and asbestos (30%) compared to the assessments developed when job titles only were available. For all three substances the percent of high probability and high confidence ratings increased from the first evaluation to the last evaluation. There was no consistent change in the level ratings.
Conclusions: Increasing the amount of information had a substantial effect on the number and direction of the exposure assessment.

P2.28 EVALUATION OF DIFFERENT METHODS FOR SAMPLING OF WOOD DUST

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Introduction: Accurate sampling and measurement methods of inhalable dusts can play a main role in monitoring of fine particles released in breathing zone of employees working at different processes in relevant industries. Through this study, the efficiencies of different dust samplers were evaluated.
Methods: In order to compare sampling efficiencies of total and inhalable dust methods, three airborne dust sampling systems, including; 7-hole sampler, close face filter, and open face filter cassettes were compared side-by-side as stationary and personal samplers in a wood industry for evaluation of their relative efficiencies. In this study, a total of 162 samples of inhalable dusts were collected and measured.
Results: The study of particle size distribution by cascade impactor indicated that the particles smaller than 4.7 μ and 11 μ comprise about 13% and 30% of the total dust respectively and therefore, about 70% of particles were grater than 11 μ. The 7-hole sampler gave a significant higher dust concentration than both open face and close face filter cassettes in all wood industry processes ($p<0.05$). This significant increased concentration was due to the higher sampling efficiency of 7-hole sampler for particles, having diameter of more than 11 μ compare to the open face and close face filter cassettes. Open and close face filters also gave statistically equivalent results of expected dust concentrations.
Conclusion: Based on the results, it is concluded that the 7-hole sampler can be a suitable and efficient choice when sampling and measurement of inhalable dusts is aimed to be evaluated in industries such as wood operations.

P2.29 EXPOSURE TO MONOTERPENES IN THE DANISH FURNITURE INDUSTRY

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Introduction: In an ongoing study: ''A follow up study of respiratory diseases among workers in the furniture industry exposed to wood dust'' we included terpene exposure as a possible confounder.
Methods: 161 passive measurements of monoterpenes (α-pinen, β-pinen, and Δ-3-caren) were done using SKC 575-003 with sorbent Anasorb 727 at 18 factories primarily using pine wood in Viborg County. Workers were grouped based on work type and in each group 25% of workers were randomly selected for terpene exposure measurements. Simultaneous occupational parameters including ventilation technique, work task and automation of work were recorded. At calculation of total concentration of terpenes the following strategy was used. When all levels of monoterpenes were positive a simple addition was done. Highest levels were observed for α-pinen. The levels of Δ3-caren and β-pinen were in general 50% and 5% of α-pinen. When values of Δ3-caren and β-pinen were below the limit of quantification (LOQ) levels were calculated using these relations. When α-pinen was below LOQ (33 cases) α-pinen was given the value ¼ LOQ.
Results: Preliminary results showed the overall terpen concentration to be GM (GSD) 6.1 (3.5) mg/m^3. When recirculation of air took place the concentration was 15.6 (3.5) mg/m^3, whereas it was 4.1 (2.7) mg/m^3 when no recirculation took place. Grouping by work task showed 6.3 (3.2) mg/m^3 when working in machining shops, 22.2 (2.6) mg/m^3 in gluing shops, 3.4 (2.7) mg/m^3 during handling and assembling and 5.2 (2.7) mg/m^3 at other work tasks. Grouping by automation showed GM (GSD) 8.2 (3.2) mg/m^3 at automatic or semiautomatic workplaces, whereas it was 2.9 (3.5) mg/m^3 at manual workplaces.
Conclusion: Working with pine wood in the Danish furniture industry does imply exposure to terpenes. Values are relatively low and below the Danish OEL of 140 mg/m^3. This was also seen when measured by worst

case strategy on some of the same companies in 1997–98. Working in gluing shops, recirculation of air and working with automatic or semiautomatic machines all seem to increase the exposure to terpenes. Further analysis will be performed and presented.

P2.30 HAEMATOLOGICAL PROFILE IN MEXICAN WORKERS EXPOSED TO BENZENE-TOLUENE-XYLENE: PRELIMINARY OUTCOMES

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Introduction: The haematotoxic effects of solvent mixture containing benzene at work places on the haematopoietic system are well documented and include aplastic anaemia and pancytopenia. Some individuals exposed repeatedly to cytotoxic concentrations of benzene develop acute myeloblastic anaemia. Aim of the study is to identify changes in the hematological profile in workers exposed to benzene-toluene-xylene (BTX).
Methods: At the moment, the study has included 89 workers, male or female and from any workplace, with mean age of 38.3 (SD 9.8) years and seniority in job of 12.2 (1.5–41) years, which are in contact with BTX in Mexican industry. Workers under treatment that promotes erythropoiesis, have undergone haemotransfusion, or recently were blood donators were excluded. A complete haematological profile was analysed in all subjects.
Results: Mean red blood cell (RBC) count: $5.4 \pm 0.3 \times 10^6$ erythrocyte/ml; haemoglobin concentration: 16.4 ± 1.03 g/dl; mean corpuscular volume: 92.4 ± 3.6 fl; Mean corpuscular haemoglobin: 30.3 ± 1.52 pg and mean corpuscular haemoglobin concentration: 32.8 ± 1.43 g/dl; mean white blood cell (WBC) count: 6580 ± 1.3/ml; differential: neutrophils polymorphonuclear: 3972/ml (61.9%); lymphocytes: 2020/ml (29.3%); monocytes: 410/ml (5.8%); eosinophils: 125/ml (1.8%) and basophils: 12/ml (0.51%); platelet count: $222 \pm 56 \times 10^3$/ml; mean platelet volume: 8.2 ± 1.0 fl. In all blood samples, 13% of them show some disorder in WBC, RBC, and platelets counts and almost 52% show some kind of qualitative disorder on platelets.
Conclusions: In spite of no impressive quantitative changes in the proposed hematologic indicators, the high proportion of qualitative changes in platelets deserves more attention. The final assessment of these effects will be better sustained when consider all hematologic outcomes and the assessment of occupational exposition to BTX that will be performed in the expected sample of workers ($n = 350$).

P2.31 EXPOSURE OF INCINERATOR AND HOME ELECTRIC APPLIANCES RECYCLING WORKERS TO DIOXINS AND BROMINATED DIPHENYL ETHERS

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Introduction: We intended to assess exposures to PCDDs, PCDFs, coplanar PCBs, and PBDEs among workers engaged in incinerator works and recycling works of home electric appliances. This study project was approved by ethical committee of NIIH.
Subjects: Subjects consist of 69 male and three female workers at three municipal solid waste incinerators (MSWI), 23 male workers at an industrial waste incinerator (IWI), and 11 male workers at a factory recycling home electric appliances (RHEA).
Methods: Written informed consents were obtained from all subjects. In the morning of examination day 70–90 ml of blood was collected from fastened subjects and then they were interviewed by occupational specialist about their job histories. Blood was used for measurements of seven PCDDs, 10 PCDFs, and 10 coplanar PCBs, of those TEF was determined by WHO. Twenty nine PBDEs were also measured.
Results: Blood PCDDs and PCDFs by TEQ were high among IWI group compared with the others. Looking from each congener, 123678HexaCDD, 123789HexaCDD, 23478HexaCDF, 123478HexaCDF, 123678HexaCDF, 234678HexaCDF, and 1234678HepCDF were highest among IWI group. Comparing coplanar PCBs, 33′44′TeCB and 233′44′PeCB were highest among RHEA group. Comparing PBDEs, 244′TrBDE and 33′4TrBDE were highest among MSWI group and 23′44′TeBDE, 33′44′TeBDE, and 23′44′5PeBDE were lowest among IWI group and highest among RHEA group. 22′44′55′HxBDE was lowest among MSWI group.
Conclusion: Comparing PCDD, PCDF, coplanar PCB, and PBDE exposures among three worker groups, MSWI group was lowest in either exposure. IWI group was highest in PCDD and PCDF exposures. RHEA group was highest in coplanar PCB and PBDE exposures.

P2.32 NOISE POLLUTION IN THE CENTRAL AREA OF TEHRAN

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Introduction: Traffic is the most important source of environmental noise pollution especially in urban areas. Noise pollution has been considered less than other contaminants in the environment. In addition to physiological effects of high level of noise exposure such as cardiovascular effects, nervous disorders, it can cause decreases in work efficiency in various occupations as well as concentration significantly and may resulted in increasing accident rate. Noise level standard of 35 dBA is introduced by WHO for rest and restorative condition.
Methods: Sound levels, $L_{eq}60$ and sound level at octave band frequencies 5–8000 Hz, have been measured at 25 various sites in the morning (7–11.30AM) and afternoon (1–5PM). Stations have been selected among heavy traffic areas, which categorised in four groups of pavement, shop, street, and barrier (street covered with accumulated trees along two sides). Above mentioned stations were located at distance of 10 m, 25 m, 5 m, and 10 m away from middle of the streets, respectively.
Results: The results showed that the average of $L_{eq}60$ for barrier, street, shop, and pavement stations were 71.8, 75.5, 68.5, and 73.3 dBA, respectively and maximum sound level for street station was 88.2 dBA, while the minimum data belong to barrier station (67 dBA). Significant variation observed between pavement $L_{eq}60$ (73.3 dBA $\pm$ 2.88) and barrier stations $L_{eq}60$ (71.8 dBA $\pm$ 2.58) measurements ($p < 0.01$). The $L_{eq}60$ values during weekend decreases significantly in comparison with other measurements during work days. But, no significant variations were observed between $L_{eq}60$ of working days ($p < 0.01$) in all stations. Measurements at octave band frequency showed that maximum and minimum sound levels for all selected stations vary from 73 to 88 dBA, respectively at 125 Hz frequency. But maximum measured sound level at 8000 Hz frequency found to be 66 dBA with a minimum of 40 dBA.
Conclusion: Compared with the environmental noise standard level in Iran for commercial area (65 dBA in daytime) the mean values of $L_{eq}60$ for all stations were exceeded and the dense trees at both sides of the street (as barriers) can decrease traffic noise intensity considerably.

P2.33 AN UPDATE ON THE STATUS OF THE MORTALITY SURVEY OF BRITISH ASBESTOS WORKERS

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Introduction: The mortality survey of British asbestos workers was set up by the Health and Safety Executive in the early 1970s to monitor the effects of exposure and provide an evidence base for effective asbestos control measures. The survey population consists of workers employed in premises or engaged in activities covered by the 1969 Asbestos Regulations, enrolled from 1971, and by the Asbestos (Licensing) Regulations (ALR), enrolled in 1984, and workers entering employment subsequently and covered under these regulations and under the Control of Asbestos at Work (CAW) Regulations from 1988. Data are collected from the individuals within the survey every two years during routine medical examinations through the identified workplaces and comprises of exposure details and smoking habits. Where possible, subjects have been ''flagged'' to allow the tracing of cancer incidence and cause of death. Formerly, this database has been developed and maintained by the Health and Safety Executive. However, in October 2004 responsibility was passed to the Health and Safety Laboratory Epidemiology and Statistics Section. This paper provides a summary of the history of the database and the analysis that has been undertaken to date. In particular the paper focuses on how these studies have lead to changes in legislation and the impact of these changes on the at risk populations. In addition, the paper explains the details of the future analysis projects to be undertaken by the Health and Safety Laboratory and how the proposed UK work fits in with other international studies in this area.

P2.34 A QUALITY BASED CRITICAL REVIEW OF THE LITERATURE DESCRIBING AND EVALUATING PROGRAMS DESIGNED TO PREVENT NEEDLESTICK INJURIES

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Introduction: Needlestick injury (NSI) can be a life threatening event for many health professionals. The transmission of bloodborne diseases, including hepatitis C virus and human immunodeficiency virus for example, as a result of workplace NSI has been documented for years. Since the enforcement of recent federal standards enacted to protect workers from NSI, hospitals and clinics have implemented new safety controls in their NSI programmes in order to reduce the risk of disease transmission, injury, or death.
Methods: We have undertaken a quality based critical review (QBCR) of the recent literature to identify evaluation programs designed to prevent NSI in the workplace. This QBCR entailed searching the National Library of Medicine database (Medline) focusing on NSI prevention programmes, especially those implementing new safety devices. Search inclusion criteria included the following: language of English, French, or German, with the focus of NSI intervention in the healthcare setting, through equipment, training programmes, or both. Exclusion criteria entailed language (not English, French, or German), no intervention, or target population not employed in health. QBCR is a type of literature review where a predetermined criteria was applied to all articles. The characteristics we prioritised entailed: clarity of reporting, intervention design characteristics, statistical rigor, and interpretation.
Results: Available evaluation studies totaled 1069 articles, of which 161 were identified as potentially useful, and another 117 were of uncertain utility because of lack of detail in their abstracts, titles, and keywords. Based on the criteria for inclusion, 92 of 278 studies identified from the preliminary search and screening process were subjected to more detailed review. Twenty two articles were dropped due to exclusion criteria, leaving 70 articles for QBCR.
Conclusions: This subset of articles is currently being assessed using a detailed quality criteria checklist, focusing on the following variables: type of intervention, target population, type of study, country, and bias issues.

P2.35 A HEALTHY HOUSEWORKER EFFECT: ON WOMEN'S INVOLVEMENT IN DOMESTIC LABOUR

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Introduction: Domestic labour involving tasks that require physical activity such as lifting, bending, cleaning, and childcare, has been reported to be deleterious to women's health. However, domestic labour, as a type of physical exercise, has been associated with positive health outcomes.
Methods: To investigate the association between women's domestic labour and self-reported illnesses. A sample of 1869 ever-married women (15–59 years) living in the outskirts of Beirut, Lebanon was studied. Women who reported at least one illness were compared, by level of involvement in domestic labour, with those who did not. Two measures were used for domestic labour: (1) a scale ranging from 0 to 7 assessed women's involvement level in household tasks: cleaning rooms, kitchens, and bathrooms, washing dishes and clothes, preparing food, and ironing. Women were grouped into two categories: low to moderate involvement and high involvement in household tasks; (2) number of children under 15 years (0; 1–2; ⩾3) as an indirect measure of childcare. A multiple logistic regression model was fitted accounting for age, weight, education, household monthly income, participation in labour force, parity, social support, and distress.
Results: Women highly involved in housework were less likely to report an illness (OR = 0.63; (95% CI 0.44 to 0.91)). Also, women with more than two children below 15 years were significantly less likely to report an illness (OR = 0.41; (95% CI 0.26 to 0.63)).
Conclusion: Reporting at least one illness was inversely associated with involvement in domestic labour. This may be an artifact resulting from the natural selection of healthier women in domestic labour, a selection bias similar to the ''healthy worker effect'' often encountered in occupational studies. The cross sectional design followed in this study provided a useful exploratory tool of the possible ''healthy houseworker effect'' that should be accounted for in research investigating women's work, including domestic labour, and health.

P2.36 WORK, HEALTH AND GENDER IN TRADITIONAL FISHING COMMUNITIES IN SERGIPE STATE, BRAZIL

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Introduction: The fishing activity in Sergipe, a small north eastern state of Brazil, comprises small scale commercial fishing and subsistence artisanal fishing, crabbing, and shell fishing.
Methods: To survey the work related safety and health conditions of these communities, 524 male and female fish workers in five traditional fishing communities in northeastern Brazil were interviewed, between 2001 and 2003, about socio-demographic issues, work organisation and environment, and work related health symptoms. Some information was completed with personal qualitative interviews.
Results: Most of the interviewed were men (70%), with a mean age of 42 years old, half of them not having concluded the elementary school. Only 15% reported sea fishing. The majority (85%) worked in fishing sector more than 10 years and 77% were self-employed. Half of the interviewed used canoes, jangadas (rafts), and boats, and they worked no more than 6 hours a day. Among the occupational risk factors reported by 75% of the interviewed there are those related to weather conditions; poisonous fish, jellyfish, and insects; diesel oil or gasoline they use to cover their bodies to avoid inset bites; smoke of the diesel lamp and boat engine; and anti-ergonomic postures. Back pain and ''tired eyes'' are the most reported symptoms related to their activity. Gender differences were present in the type of activity, number of dependents in the family, and income. Less than a half (43%) reported injuries that led to absent from their activities; only 28 cases were severe enough to keep workers away for more than 15 days. Only 16% stated they knew ''something about occupational safety and health'' and 29% had information on their work and social welfare rights and duties. Some women reported not knowing how to swim, although working daily on a boat.
Conclusion: Although several governmental and nongovernmental efforts have started to improve social and economic conditions of these fish workers, they still need to be informed on the safety and health issues as well as loan or social welfare opportunities. Low level of education and lack of opportunities for work and the region they live are the main reasons for these fish workers to improve their condition or change jobs.